

## **OUTSIDE VEHICLE DOOR HANDLE**

### **Cross-Reference to Related Application**

[001] This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/392,411, filed June 28, 2002.

### **Field of the Invention**

[002] This invention relates to a handle assembly for opening a door of a motor vehicle. More particularly, the invention relates to a handle assembly including a bidirectionally movable door handle for opening a door from inside and outside of a motor vehicle.

### **Description of Related Art**

[003] Many pick-up trucks include a passenger cab having a rear seat positioned behind a front row of seats for accommodating additional passengers. These pick-up trucks typically include a third or fourth rear door located directly behind a front door to aid passengers when entering and exiting the rear seats. The rear door also provides convenient access to the space behind the front row of seats during loading and unloading of items.

[004] In certain pick-up trucks, the front and rear doors swing open in opposite directions from one another, historically referred to as a "clamshell design". These pick-up trucks generally include an inside handle mounted along an inner surface of the rear door for actuation from inside the motor vehicle. In addition, a second handle is provided along a forward vertical edge of the rear door for actuation from outside the motor vehicle.

[005] One example of a rear door including multiple handles is provided in United States Patent 5,794,611 to Watson et al., which discloses a door latch remote control assembly for a motor vehicle having a dual-door arrangement. The motor vehicle includes a shut face door opening handle and an inside handle mounted to a rear door. The handles are operatively connected to upper and lower door latches for opening the rear door. The door latch remote control assembly includes a back plate for supporting first and second operating levers, which are actuated by the handles. The first and second operating levers are pivotally mounted to a

split pin. A bellcrank release lever is also mounted along the split-pin for movement between a resting position and a door latch releasing position. The bellcrank release lever, which includes a first arcuate guide slot, is connected by links to the door latches. A locking lever pivots on the back plate via a pivot pin disposed parallel to the split pin. The locking lever includes a second arcuate guide slot extending between a proximate end and a distal end. A link pin extends through the first and second arcuate guide slots. When the locking lever is in a release mode, the link pin contacts the proximate end of the second arcuate guide slot. As a result, the locking lever holds the link pin at a distal end of the first arcuate guide slot of the bellcrank release lever. The bellcrank release lever can then be pivoted about the split pin to a latch release position, in which the link pin contacts a distal end of the second arcuate guide slot. When the locking lever is in a locking mode, the second arcuate guide slot holds the link pin in contact with a proximate end of the first arcuate guide slot.

#### **Summary of the Invention**

[006] The use of multiple handles is not cost-effective due to the additional parts required. Thus, a single handle that may be actuated from both inside and outside the pick-up truck would be desirable for reducing the number of parts incorporated in a pick-up truck having a rear or third door.

[007] Therefore, according to one aspect of the invention, there is provided a handle assembly for unlatching a door latch to open a door of a motor vehicle. The handle assembly includes a housing secured to the door. The housing defines a well. A handle is pivotally secured to the housing for movement between a rest position and actuating positions into and out of the well. The handle assembly also includes a bell crank that is pivotally mounted to the housing and operatively engaged with the handle. In addition, the handle assembly includes a release lever that is pivotally mounted to the housing and selectively coupled to the bell crank. The release lever is operatively connected to the door latch. Movement of the handle in either direction from its rest position pivots the bell crank and the release lever together relative to the housing to unlatch the door.

### **Brief Description of the Drawings**

[008] Advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is a rear perspective view of a motor vehicle including a handle assembly according to the invention secured to a rear door;

Figure 2 is a side view of the handle assembly including a housing and a handle pivotally secured thereto;

Figure 3 is a top view of the handle assembly;

Figure 4 is a side view taken along lines 4-4 of Figure 3 with the handle in a rest position;

Figure 5 is a side view taken along lines 4-4 of Figure 3 with the handle in a first actuating position;

Figure 6 is a side view taken along lines 4-4 of Figure 3 with the handle in a second actuating position;

Figure 7 is a side view of an interlock mechanism;

Figure 8 is a side view taken along lines 4-4 of Figure 3 with a locking lever in a lock position;

Figure 9 is a side view taken along lines 4-4 of Figure 3 with the handle in the first actuating position while the locking lever is in the lock position; and

Figure 10 is a side view taken along lines 4-4 of Figure 3 of the handle assembly with the handle in the second actuating position while the locking lever is in the lock position.

### **Detailed Description of the Preferred Embodiment**

[009] Referring to Figure 1, a motor vehicle 10 includes two primary doors 12 (one shown) and a rear or third door 14 directly rearward thereto for providing access to a passenger compartment 16. In the embodiment shown, the motor vehicle 10 is a pick-up truck. The front door 12 is mounted along an A-pillar 18 and the rear door 14 is mounted along a C-pillar 20, thereby obviating the need for a B-pillar between the A-pillar 18 and the C-pillar 20. The front 12 and rear 14 doors open in opposite directions to allow individuals to comfortably enter and exit a rear portion of the passenger compartment 16. In addition, easy loading and unloading of

items into and out of the rear portion of the passenger compartment 16 is provided when the front 12 and rear 14 doors are open.

[010] A handle assembly, generally indicated at 22, is fixedly secured to the rear door 14 and is disposed adjacent a forward vertical edge 24 thereof. The handle assembly 22 is operatively connected to upper 26 and lower 28 door latches by links 30. Upon actuation of the handle assembly 22 when the front door 12 is open, the upper 26 and lower 28 door latches are unlatched to open the rear door 14.

[011] Referring to Figures 2 and 3, the handle assembly 22 includes a housing 32 having an interior surface 34 and an opposing exterior surface 36. The housing 32 defines a well or recessed portion 38 along the interior surface 34 having an open end 40 and a closed end 42. The well 38 includes a plurality of screw apertures 44, 46 to receive screws 48, 50 for attachment with a base plate 52 of the housing 32, which is described in greater detail below.

[012] A pivot bar 54 extends through the well 38 adjacent the closed end 42 thereof. A handle 56 is pivotally mounted to the housing 32 by the pivot bar 54. The handle 56 includes an access opening 58, a raised gripping portion 60, and a complementing finger recess 61.

[013] The well 38 also includes well apertures 62. A pair of arms 66, 68 is mounted along opposite ends of the pivot bar 54 and each of the pair of arms 66, 68 extends through one of the well apertures 62. The pivoting of the handle 56 out of and into its rest position responsively pivots the arms 66, 68. Each of the pair of arms 66, 68 terminates at a distal end 70.

[014] With the front door 12 of the motor vehicle 10 opened, the handle 56 is bidirectionally movable from a rest position, shown in Figure 3, to first and second actuating positions. In the first actuating position, the handle 56 is pivoted out of the well 38 in the direction of arrow A. Such pivotal movement of the handle 56 will typically occur when an individual pulls the handle 56 from inside the motor vehicle 10.

[015] When moving the handle 56 to the second actuating position, the handle 56 is pivoted into the well 38 in the direction of arrow B. Such pivotal movement of the handle 56

will typically occur when an individual pulls the handle 56 from outside the motor vehicle 16. Such bi-directional movement of the handle 56, combined with the placement of the handle assembly 22 at the forward vertical edge 24 of the rear door 14, allows the same handle 56 to be used by operators that may be located either inside or outside the motor vehicle 10.

[016] The base plate 52 of the housing 32 is fixedly secured to the rear door 14 and includes an inboard surface 72, shown in Figures 2 and 3. The housing 32 abuts the inboard surface 72 of the base plate 52 such that when the handle assembly 22 is mounted to the rear door 14, the interior surface 34 of the housing 32 faces the inside of the passenger compartment 16.

[017] Referring to Figure 4, the base plate 52 also includes an outboard surface 74 opposite the inboard surface 72. A bell crank 76, release lever 78, and locking lever 80 are each pivotally mounted to the housing 32 along the outboard surface 74 of the base plate 52, as shown in Figures 4 through 6. Thus, when the handle assembly 22 is mounted to the rear door 14, the outboard surface 74 of the base plate 52 abuts the rear door 14.

[018] The base plate 52 includes a plurality of access apertures 82. The plurality of access apertures 82 provide access for the pair of arms 66, 68 to engage the bell crank 76 mounted along the outboard surface 74 of the base plate 52.

[019] The bell crank 76 is pivotally mounted about a first pivot pin 84. A spring 86 extends around the first pivot pin 84 to bias the bell crank 76 into a neutral position, as shown in Figure 4. The bell crank 76 includes a pair of oppositely facing tabs 90, 92. Upon pivoting of the handle 56 out of the rest position in either direction, one of the pair of arms 66, 68 engages one of the oppositely facing tabs 90, 92 to pivot the bell crank 76 out of the neutral position, as shown in Figures 5 and 6.

[020] The bell crank 76 also includes a bell crank aperture 94 having a detent 96 defining a nesting portion 89. The detent 96 selectively retains a guide pin 98 in a nesting

position to couple the bell crank 76 to the release lever 78 when the bell crank 76 is pivoted by the pair of arms 66, 68, as shown in Figures 5 and 6.

[021] The bell crank aperture 94 also includes an upper recess 99. The guide pin 98 is positioned within the upper recess 99 before the handle 56 is assembled with the base plate 52, i.e., during shipping of the parts, to ensure that the pair of oppositely facing tabs 90, 92 is properly engaged with the pair of arms 66, 68 upon assembly.

[022] A bumper 100 is fixedly secured over each of the oppositely facing tabs 90, 92 of the bell crank 76. The bumper 100 absorbs noise vibrations generated by the engagement of the pair of arms 66, 68 with the pair of oppositely facing tabs 90, 92. A stop 102 is fixedly mounted to the base plate 52 along the outboard surface 74 thereof to prevent overtravel of the bell crank 76 after the spring 86 biases the bell crank 76 back to its neutral position, as shown in Figure 4.

[023] The release lever 78 is also pivotally mounted about the first pivot pin 84. The release lever 78 includes an elongated slot 104 extending between a proximate end 106 and a distal end 108 for receiving the guide pin 98.

[024] The release lever 78 extends between opposing release ends 110, 112. Each of the release ends 110, 112 is attached to one of the links 30. Thus, the pivoting of the release lever 78 pulls each of the links 30 to unlatch the upper 26 and lower 28 door latches.

[025] The locking lever 80 is pivotally mounted about a second pivot pin 114 for movement between an unlock position, as shown in Figures 4 through 6, and a lock position, as shown in Figures 8 through 10. The locking lever 80 includes a guide slot 116 extending between upper 118 and lower 120 ends. The guide pin 98 is received within the guide slot 116 and moves between the upper 118 and lower 120 ends when the guide pin 98 retained by the detent 96 and the bell crank 76 is pivoted by movement of the handle 56 out of its rest position.

[026] Referring to Figure 4, when the handle 56 is in the rest position and the locking lever 80 is in the unlock position, the guide pin 98 is retained by the detent 96 of the bell crank

aperture 94 in the nesting position. At the same time, the guide pin 98 is located adjacent the distal end 108 of the release lever 78 and at the upper end 118 of the guide slot 116 of the locking lever 80.

[027] Referring to Figure 5, when an individual actuates the handle 56 to the first actuating position from inside the motor vehicle 10, the handle 56 is pivoted away from the well 38. With the locking lever 80 in the unlock position, this pivoting of the handle 56 causes one 68 of the pair of arms 66, 68 to engage one 92 of the pair of oppositely facing tabs 90, 92 to pivot the bell crank 76. Since the guide pin 98 is in the nesting position, the release lever 78 pivots with the bell crank 76. The pivoting of the release lever 78 pulls the links 30 to unlatch the upper 26 and lower 28 door latches.

[028] Referring to Figure 6, when an individual actuates the handle 56 to the second actuating position from outside the motor vehicle 10, the handle 56 is pivoted into the well 38. With the locking lever 80 in the lock position, this pivoting of the handle 56 causes the other one 66 of the pair of arms 66, 68 to engage the other one 90 of the pair of oppositely facing tabs 90, 92 to pivot the bell crank 76. Since the guide pin 98 is in the nesting position, the release lever 78 pivots with the bell crank 76. The pivoting of the release lever 78 pulls the links 30 to unlatch the upper 26 and lower 28 door latches.

[029] Referring to Figure 7, an interlock mechanism 122 is provided for selectively pivoting the locking lever 80 into its lock position, in which the guide pin 98 is moved over the detent 96 and out of the nesting position. When the locking lever 80 is in its lock position, movement of the handle 56 in either direction from its rest position will prevent unlatching of the upper 26 and lower 28 door latches.

[030] The interlock mechanism 122 is mounted to a shut face (not shown) of the rear door 14 and includes a bezel 124. A lockout lever 126 is pivotally mounted along an outer surface 125 of the bezel 124 while an interlock bell crank 128 is pivotally mounted along an opposing inner surface 127 of the bezel 124. A shield 132 is secured to the bezel 124 to prevent moisture from interfering with the lockout lever 126 and the interlock bell crank 128.

[031] When the front door 12 is closed against the rear door 14, the front door 12 engages the lockout lever 126. In response, the lockout lever 126 engages the interlock bell crank 128 to pivot the interlock bell crank 128. A rod 130 extends between the interlock bell crank 128 and the locking lever 80. The pivoting of the interlock bell crank 128 pulls the rod 130 to move the locking lever 80 from its unlock position to its lock position.

[032] Referring to Figure 8, the locking lever 80 is shown in the lock position with the handle 56 in the rest position. In the lock position, the locking lever 80 urges the guide pin 98 over the detent 96 and out of the nesting position. The movement of the guide pin 98 out of the nesting portion decouples the bell crank 76 from the release lever 78.

[033] Thus, with the front door 12 closed and the locking lever 80 in the lock position, when the handle 56 is pivoted into its first and second actuating positions, as shown in Figures 9 and 10 respectively, the bell crank 76 pivots relative to the release lever 78. The release lever 78 remains stationary and, as a result, the links 30 connected thereto are not pulled and the rear door 14 remains latched.

[034] The invention has been described in an illustrative manner. It is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the invention are possible in light of the above teachings and thus the invention may be practiced other than as specifically described.